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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/627,185	07/24/2003	Samantha S. H. Tan	59081-8009.US01	2697

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PERKINS COIE LLP
P.O. BOX 2168
MENLO PARK, CA 94026

EXAMINER

CULBERT, ROBERTS P

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 04/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/627,185

Applicant(s)

TAN ET AL.

Examiner

Roberts Culbert

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 February 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 and 12-15 is/are rejected.
- 7) ☒ Claim(s) 8-11 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

Applicant's election of Claims 1-15 in the reply filed on 2/22/05 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

Claims 2-5 and 13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 2-5 and 13 recite the limitation of roughness (e.g. 10 Ra, 16 Ra etc.) The average surface roughness values (Ra) are indefinite because they do not include appropriate measurement units such as microinches, micrometers or nanometers.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 6 and 7 are rejected under 35 U.S.C. 102(b) as being anticipated by JP 50087974

A to Matsushita.

Matsushita teaches a method of treating a quartz (silica) substrate comprising preparing a quartz substrate to provide a working surface having an initial working surface roughness and ultrasonically acid-

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etching the working surface to increase the surface area 5-10 times (increase roughness by at least about 50%)

Although Matsushita does not explicitly teach the increase in surface roughness, the examiner asserts that that the process would obviously provide the claimed property and the examiner hereby burdens the applicant to show that the process shown by the prior art does not meet or obviate the claimed invention.

Since the Office does not have facilities to test the prior art against Applicant's invention, it is the Examiner's prerogative to burden the Applicant to do the same when certain physical properties appear to be present in the prior art even though not explicitly taught thereby.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 4-7, 12, 13 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,368,410 to Gorczyca et al. in view of U.S. Patent 4,957,583 to Buck et al.

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Regarding claims 1, 6, 7 and 12, Gorczyca et al. teaches a method of treating a quartz substrate comprising preparing a quartz substrate to provide a working surface having an initial working surface roughness (Col. 3, Lines 10-63) and acid-etching the working surface (Col. 3, Line 64 – Col. 4, Line 19) to increase the surface roughness by at least about 10%

Gorczyca et al. does not teach using ultrasonic etching.

However it is notoriously old and well known in the etching art to use an ultrasonicator to stir or agitate an etching solution to increase the etch rate and etch uniformity.

For example, Buck et al. teaches that it is known in the etching art to use ultrasonics in lieu of magnetic stirring to agitate an etching solution and hereby eliminate “dead spots”. See (Col. 1, Line 18 – 68)

It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to use an ultrasonicator to agitate the etching solution of Gorczyca.

One of ordinary skill in the art would have been motivated at the time of invention to use ultrasonic etching in order to uniformly etch the quartz substrate.

Although Gorczyca et al. in view of Buck et al. does not explicitly teach the roughness is increased by 10%, 25% or 50%, since the method steps of grit blasting and acid etching are the same as in the claimed invention the steps either would produce the same result, or else the result arises from essential limitations not present in the claims. Further, a direct comparison of the roughness produced in prior art references and the claimed invention cannot be made since no units are provided in the claimed invention for average roughness (Ra)

Further Regarding Claim 12, Gorczyca teaches that the etching process removes cracks in the surface of the quartz substrate (Col. 3, Line 64 – Col. 4, Line 20) and further teaches subjecting the substrate to a final cleaning process that prepares the substrate for use. (Col. 5, Lines 52-65)

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Regarding Claim 15, Gorczyca teaches micro-roughening the surface of the substrate prior to the final cleaning process by positioning a pressurized grit expulsion nozzle (Col. 3, Lines 10-63) at an angle from 30-90° and ejecting grit from the nozzle at sufficient velocity to produce a micro-roughened surface.

Regarding Claim 4, 5, and 13, Gorczyca teaches that the quartz substrate is subjected to coarse grit blasting to produce an initial surface roughness using grit having a size between 1 and 800 microns. See (Col. 3, Lines 10-15). A direct comparison of the roughness produced in prior art references and the claimed invention cannot be made since no units are provided in the claimed invention for average roughness (Ra). However, it is clear that the roughness would be the same in the prior art and the claimed invention since the process (roughness increase using grit blasting) and process conditions (grit size, etc.) are the same. Further the desired roughness increase is the same in the prior art and the claimed invention since the same roughness would be necessary to produce a surface with optimal adhesion to deposits formed in a semiconductor processing chamber.

Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,368,410 to Gorczyca et al. in view of U.S. Patent 4,957,583 to Buck et al. as applied above to claims 1, 4-7, 12, 13 and 15 and in further view of the applicant's admitted prior art (APA).

Regarding Claims 2 and 3, as applied above to claim 1, Gorczyca et al. in view of Buck et al. teaches the method of the invention substantially as claimed, but does not teach that the quartz initially has an initial working surface roughness of greater than about 10 Ra or about 16 Ra.

However the admitted prior art (APA) teaches that quartz is usually manufactured with a surface roughness of about 16 Ra. (Page 2, Last Paragraph)

It would have been obvious to one of ordinary skill in the art at the time of invention to use the conventional quartz stock in order to provide a suitable quartz substrate for a deposition apparatus.

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,368,410 to Gorczyca et al. in view of U.S. Patent 4,957,583 to Buck et al. as applied above to

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claims 1, 4-7, 12, 13 and 15 and in further view of U.S. Patent Application Publications

2003/0091835 to Takahashi et al. 2004/0000327 to Somboli et al. and 2004/0238487 to Kiehlbauch et al.

Regarding Claim 14, Gorczyca teaches a final cleaning process including rinsing and ultrasonically cleaning the substrate in deionized water, (Col. 5, Lines 52-56) but does not teach contacting the quartz substrate with an acidic solution of HF:HNO₃:H₂O, drying with nitrogen, and oven heating.

However the omitted treatment steps are well known in the art for preparing a quartz substrate for use. For example, Takahashi et al. teaches that it is conventional to perform a step of oven drying after ultrasonic rinsing in order to prepare a quartz substrate for use after a texturing process. It would have been obvious to one skilled in the art at the time of the claimed invention to perform oven drying in order to dry the substrate in the conventional manner.

Kiehlbauch et al. teaches that after texturing a quartz surface using mechanical polishing and etching, it is known to clean the surface with a mixture selected from HF, HNO₃, H₂O₂ etc. to remove metal contaminants from the quartz surface. (Paragraph 39) It would have been obvious to one skilled in the art at the time of the claimed invention to use an acidic solution of HF:HNO₃:H₂O in order to remove contaminants using suitable solvents.

Somboli et al. teaches that it is preferred to perform a step of nitrogen drying after rinsing quartz with deionized water following a texturing process. (Paragraphs 87-89) It would have been obvious to one skilled in the art at the time of the claimed invention to perform nitrogen drying in order to prepare the substrate for use in the conventional manner.

Allowable Subject Matter

Claims 8-11 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

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The prior art of record fails to teach or render obvious a method of teaches a method of treating a quartz substrate comprising preparing a quartz substrate to provide a working surface having an initial working surface roughness and ultrasonically acid-etching the working surface to increase the surface roughness by at least about 10% and grit blasting the working surface after ultrasonically acid etching the working surface with a fine grit having a mesh size greater than about 100.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Roberts Culbert whose telephone number is (571) 272-1433. The examiner can normally be reached on Monday-Friday (8:30-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

R. Culbert



P. Hassanzadeh
SPE, AU 1763